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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/080,913	02/21/2002	Luu Thanh Nguyen	NSC1P131X1	1176

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EXAMINER	
FARAHANI, DANA	
ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 10/22/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/080,913	NGUYEN ET AL.	
	Examiner	Art Unit	
	Dana Farahani	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *19-43* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *19-43* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claims 19, 22, 24, and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishiguchi et al., hereinafter Nishiguchi (U.S. Patent 5,214,308), newly cited.

Regarding claims 19, 24, and 27, Nishiguchi discloses in figures 2 and 3 an apparatus comprising a flip chip integrated circuit 1 having bond pads with solder bumps 2 formed directly on an active surface of the flip chip; and a layer of an underfill layer (not shown, see column 3, lines 45-52) is formed on the active surface, and around the bumps of the flip chip integrated circuit.

Regarding claim 26, the substrate 3 has a plurality of contact pads 5, which connect the flip chip to the substrate.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi.

Nishiguchi discloses the limitation in claim 23, as discussed above, except for the relative dimensions of the bumps and the adhesive. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the contact bumps smaller or larger according to a specific application.

5. Claims 20 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi, as applied to claim 19 above, and further in view of Kato (U.S. Patent 6,486,562), previously cited.

Nishiguchi discloses the limitation in claims 19 and 20, as discussed above, except for the adhesive being an epoxy resin.

Kato discloses at column 2, lines 10-15, that epoxy resin is used to increase mechanical coupling between a substrate and a flip chip. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use epoxy resin as the adhesive in Nishiguchi structure in order to enhance mechanical coupling between the substrate and the flip chip.

6. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi, as applied to claim 19 above, and further in view of Morihara (U.S. Patent 5,495,439), previously cited.

Nishiguchi discloses the limitations in claims 19 and 21, as discussed above, except for coefficient of thermal expansion of the substrate is substantially similar to the adhesive.

Morihara discloses a device package wherein an adhesive layer has coefficient of thermal expansion same as a substrate in which it is located. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the device in Schuelle such that coefficient of thermal expansion of the adhesive is same as the substrate to reduce stress related failures due to coefficient of thermal expansion mismatch between the substrate and the adhesive layer.

7. Claims 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi.

Nishiguchi discloses the limitation in the claim, except for the range of coefficient of thermal expansion of the adhesive, and other properties of the adhesive mentioned in those claims. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose appropriate range of coefficient of thermal expansion for a particular application, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233.

8. Claims 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi, as applied to claim 19 above, and further in view of Chiu et al., hereinafter Chiu (U.S. Patent 6,391,683), previously cited.

Nishiguchi discloses the limitations in those claims, as discussed above, except for a dam around the underfill adhesive and a solder, or fluxing material on the substrate. Chiu discloses in figure 3C dam 111 around resin 141, and resin 141 is on substrate 110. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a resin material on the substrate of Nishiguchi, and further form a dam around it in order to support the contacts 34 of the Nishiguchi structure, while preventing the material from flowing to peripheral areas of the substrate.

9. Claims 35, 36, and 39, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi in view of Holzapfel et al., hereinafter Holzapel (U.S. Patent 5,872,633), previously cited.

Nishiguchi discloses the limitations in the claims, as discussed above, except for a plurality of die.

Holzapfel discloses in figure 6 a semiconductor device with a plurality of die 406.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use a plurality of die in the Nishiguchi reference in order to make an array of chip packages to be used in various applications, as this is common in the semiconductor manufacturing industry.

10. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi in view Holzapfel.

Nishiguchi and Holzapfel disclose the limitation in claim 35, as discussed above, except for the relative dimensions of the bumps and the adhesive. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 16 USPQ 2d 1934, 1936 (Fed. Cir. 1990). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the contact bumps smaller or larger according to a specific application.

11. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi in view Holzapfel, as applied to claim 35 above, and further in view of Kato (U.S. Patent 6,486,562), previously cited.

Nishiguchi and Holzapfel disclose the limitation in the claim, as discussed above, except for the adhesive being an epoxy resin.

Kato discloses at column 2, lines 10-15, that epoxy resin is used to increase mechanical coupling between a substrate and a flip chip. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use epoxy resin as the adhesive in Nishiguchi structure in order to enhance mechanical coupling between the substrate and the flip chip.

12. Claims 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi in view Holzapfel.

Nishiguchi in view Holzapfel renders obvious the limitations in the claims, except for the range of coefficient of thermal expansion of the adhesive, and other properties of the adhesive mentioned in those claims. It would have been obvious to one of ordinary skill in the art at the time of the invention to choose appropriate range of coefficient of thermal expansion for a particular application, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

13. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiguchi in view Holzapfel, as applied to claim 35 above, and further in view of Chiu et al., hereinafter Chiu (U.S. Patent 6,391,683), previously cited.

Nishiguchi in view Holzapfel renders obvious the limitations in those claims, as discussed above, except for a dam around the underfill adhesive and a solder, or fluxing material on the substrate.

Chiu discloses in figure 3C dam 111 around resin 141, and resin 141 is on substrate 110. Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention to use a resin material on the substrate of Nishiguchi, and further form a dam around it in order to support the contacts 34 of the Nishiguchi structure, while preventing the material from flowing to peripheral areas of the substrate.

Product-by-Process Limitations

While not objectionable, the Office reminds Applicant that "product by process" limitations in claims drawn to structure are directed to the product, per se, no matter how actually made. *In re Hirao,* 190 USPQ 15 at 17 (footnote 3). See also, *In re Brown,* 173 USPQ 685; *In re Luck,* 177 USPQ 523; *In re Fessmann,* 180 USPQ 324; *In re Avery,* 186 USPQ 161; *In re Wethheim,* 191 USPQ 90 (209 USPQ 554 does not deal with this issue); *In re Marosi et al.,* 218 USPQ 289; and particularly *In re Thorpe,* 227 USPQ 964, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or otherwise. Note that applicant has the burden of proof in such cases, as the above case law makes clear. Thus, no patentable weight will be given to those process steps which do not add structural limitations to the final product.

For example, in claims 27, 33 and 34, the timing of the adhesive cure, solder paste and fluxing material on the substrate are considered methods of forming the device and not limitation of the final product. Therefore, such limitations are given no patentable weight.

Response to Arguments

14. Applicant's arguments with respect to the rejected claim have been considered but are moot in view of the new grounds of rejection.

Conclusion

15. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

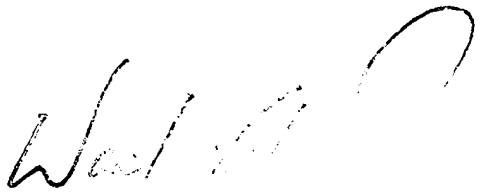
A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (703)305-1914. The examiner can normally be reached on M-F 9:00AM - 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (703)308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703)872-9318 for regular communications and (703)872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Dana Farahani
October 19, 2003



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